

What is claimed is:

5 1. An isolated nucleic acid comprising the sequence shown in SEQ ID NO: 1 encoding a Melanoma Differentiation Associated Gene -5 (Mda-5) polypeptide.

10 *Sub B9 1* 2. An isolated nucleic acid comprising a derivative of the sequence of SEQ ID NO:1 encoding a polypeptide which is functionally equivalent to Mda-5.

15 3. A fragment of the isolated nucleic acid of claim 1, wherein the fragment encodes a polypeptide having Mda-5 biological activity, wherein the biological activity is characterized by cancer cell growth suppression, apoptosis or anti-viral activity.

20 4. A nucleic acid which hybridizes to the DNA shown in SEQ ID NO:1 or the complementary strand thereof.

25 5. A vector comprising the nucleic acid of claim 1, 2 or 4.

6. A host cell comprising the vector of claim 5.

7. The host cell of claim 6, wherein the host cell is stably transformed with the vector of claim 5.

30 8. The host cell of claim 6, wherein the host cell is a tumor cell.

9. The host cell of claim 6, wherein the host cell is a melanocyte.

10. The host cell of claim 6, wherein the cell is an immortalized cell.
11. The host cell of claim 8, wherein the tumor cell is a melanoma cell, a neuroblastoma cell, an astrocytoma cell, a glioblastoma multiforme cell, a cervical cancer cell, a breast cancer cell, a lung cancer cell or a prostate cancer cell.
12. A method for determining whether a compound is an inducer of Mda-5 gene expression in a cell which comprises:
  - (a) contacting a cell with a first compound, wherein the cell comprises a nucleic acid encoding Mda-5 having the sequence shown in SEQ ID NO:1, or a functional equivalent thereof;
  - (b) measuring the level of either (i) Mda-5 mRNA produced or (ii) Mda-5 polypeptide expressed by the cell in the presence of the first compound;
  - (c) comparing the expression level of Mda-5 mRNA or polypeptide measured in step (b) with the level measured in the absence of the first compound, so as to determine whether the first compound is an inducer of Mda-5 gene expression in the cell.
13. The method of claim 12, wherein the first compound is a small organic molecule having a weight of about 5 kilodaltons or less.
14. The method of claim 12, wherein the first compound is an interferon- $\alpha$ , interferon- $\beta$ , interferon- $\gamma$ , TNF- $\alpha$ , a virus, or a double-stranded RNA molecule.
15. The method of claim 12, wherein the cell is a HO-1 human

melanoma cell.

16. The method of claim 12, wherein the cell is a melanoma cell, a neuroblastoma cell, an astrocytoma cell, a glioblastoma multiforme cell, a cervical cancer cell, a breast cancer cell, a lung cancer cell or a prostate cancer cell.
17. The method of claim 12, wherein the level of Mda-5 gene expression measured is from 10 to 1000 fold higher than the level of Mda-5 gene expression measured in the absence of the compound.
18. The method of claim 12, wherein presence of a second compound which synergizes with the first compound which induces Mda-5 expression contacted with the cell in step (a).
19. The method of claim 12, wherein presence of a second compound which is an antagonist of the first compound that induces Mda-5 expression is admixed with the cell and first compound in step (a).
20. The method of claim 18 or 19, wherein the second compound is a small molecule of about molecular weight 10 kilodaltons or less.
21. An isolated polypeptide having the amino acid sequence shown in SEQ ID NO:2 encoding Mda-5.
22. An isolated antibody which specifically binds to the polypeptide having the sequence shown in SEQ ID NO:2.
23. The antibody of claim 22, wherein the antibody is a monoclonal antibody.
- 35 24. A method for treating cancer in a subject suffering therefrom

which comprises administering to the subject an effective amount of a compound identified by the method of claim 12 and a pharmaceutically acceptable carrier, so as to induce terminal differentiation of the cancer cells in the subject and thereby treat the cancer.

5 25. The method of claim 24, wherein the cancer is melanoma, neuroblastoma, astrocytoma, glioblastoma multiforme, cervical cancer, breast cancer, colon cancer, prostate cancer, 10 osteoscarcoma, or chondrosarcoma.

*Ru<sup>26</sup>* 26 21. The method of claim 24, wherein the cancer is a cancer of the central nervous system of the subject.

15 27. The method of claim 24, wherein the administering is carried out via injection, oral administration, topical administration, adenovirus infection, liposome-mediated transfer, topical application to the cells of the subject, or microinjection.

20 28. The method of claim 24, wherein the carrier is an aqueous carrier, a liposome, or a lipid carrier.

25 29. 34. An assay to determine whether a compound modifies enzymatic activity of an Mda-5 polypeptide which comprises monitoring enzymatic conversion of a substrate to an endproduct.

30 30. 35. The assay of claim 34, wherein the enzymatic activity monitored is helicase activity.